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PHEASANT RAISING IN THE UNITED STATES.

BY

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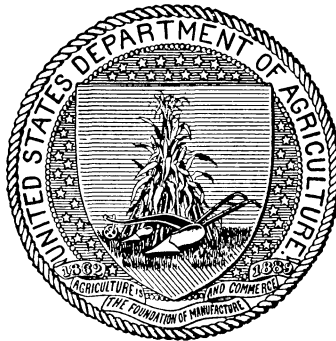
WITH A CHAPTER ON

DISEASES OF PHEASANTS.

BY

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LETTER OF TRANSMITTAL.

U. S. DEPARTMENT OF AGRICULTURE,
BUREAU OF BIOLOGICAL SURVEY,
Washington, D. C., January 18, 1910.

SIR: I have the honor to submit herewith and to recommend for publication as a Farmers' Bulletin a report on Pheasant Raising in the United States, by Henry Oldys, assistant in the Biological Survey. The propagation of pheasants is a comparatively new industry in the United States, but it has grown rapidly in the past few years, and by proper management may be made profitable. A steadily growing demand for pheasants insures a ready market for all that can be raised. The present bulletin, prepared in response to numerous inquiries for information on the subject, is designed to present a clear and concise account of the methods used by successful pheasant raisers. To add to its practical value, a chapter on the diseases to which pheasants are subject has been contributed by Dr. George Byron Morse, of the Bureau of Animal Industry.

Respectfully,

C. HART MERRIAM,
Chief, Biological Survey.

Hon. JAMES WILSON,
Secretary of Agriculture.

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FIG. 1.—Pheasants feeding—state game farm near Springfield, Ill. (From photograph furnished by the state game commissioner.)

PHEASANT RAISING IN THE UNITED STATES.

INTRODUCTION.

Within recent years a new industry, the rearing of pheasants, has begun to engage attention in the United States, and propagating ventures, ranging from the single pen with one or two pairs of birds to the pheasantry of many acres and thousands of birds, are scattered throughout the country. Some of these experiments have been conducted by the States through their game officials; others by associations and individuals. In a few cases large expense has been incurred and great care and attention have been bestowed on the experiments. Efforts have been made also to stock numerous public and private parks, preserves, and aviaries. To supply the demand, not only have pheasants been imported from the Old World, but many persons in this country have undertaken to rear them. In view of the widespread and rapidly increasing interest in the subject, the Department of Agriculture has made a special investigation of the methods of pheasant raising. The results are here condensed in the form of practical suggestions for the benefit of those interested in the industry.

SPECIES OF PHEASANTS.

A few words as to different kinds of pheasants are essential to a proper understanding of the subject of pheasant propagation.

The ringneck pheasant (*Phasianus torquatus*), usually imported from China, its natural home, has a broad white ring about the neck. It is variously called ringneck pheasant, Chinese pheasant, China pheasant, China torquatus pheasant, Chinese ringneck, Mongolian pheasant, Denny pheasant, and Oregon pheasant (fig. 2).^a

The English pheasant (*Phasianus colchicus*) has no ring about the neck. It is imported from Europe, but in comparatively small numbers, and is known as the English pheasant, dark-necked pheasant, and Hungarian pheasant (fig. 3).

^a Present knowledge indicates that the ringneck really comprises several species and subspecies that have been included under a single name, but in the absence of a final decision of the matter the name will here be used as referring to a single species.

The English ringneck pheasant (*Phasianus colchicus* × *torquatus*), a hybrid between the English and ringneck pheasants, has been

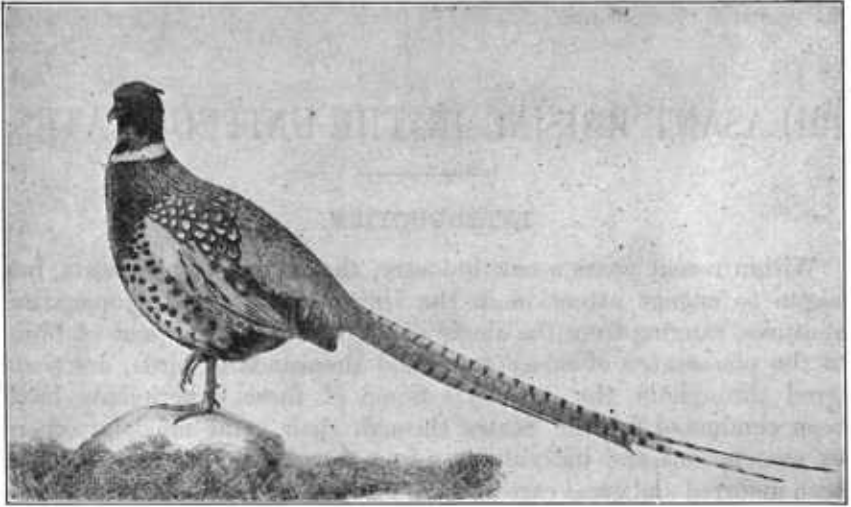


FIG. 2.—Ringneck pheasant (*Phasianus torquatus*). (From photograph of specimen in the U. S. National Museum mounted by Nelson R. Wood.)

brought from Europe in large numbers. It is generally correctly named, but is sometimes designated as English pheasant, ringneck

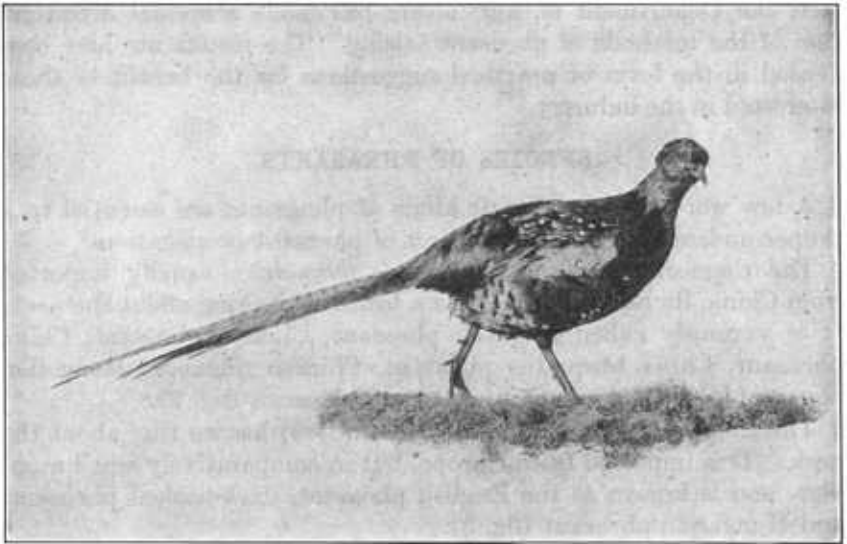


FIG. 3.—English pheasant (*Phasianus colchicus*). (From photograph of specimen in the U. S. National Museum mounted by Harry Denslow.)

pheasant, and even Mongolian pheasant. It often has more or less of the blood of the versicolor pheasant of Japan (*Phasianus versi-*

color, fig. 11). In England both the English pheasant and the English ringneck are referred to as the common pheasant.

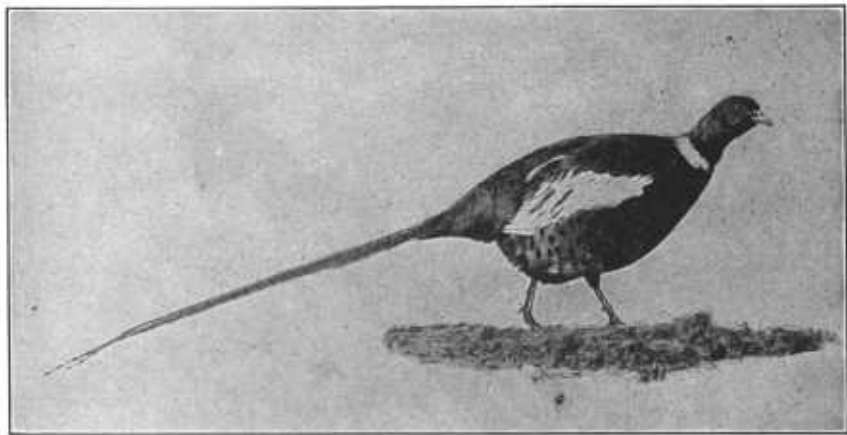


FIG. 4.—Mongolian pheasant (*Phasianus mongolicus*). (From photograph of specimen in the U. S. National Museum mounted by Harry Denslow.)

The Mongolian pheasant (*Phasianus mongolicus*, fig. 4), which has a more or less complete white ring about the neck, but in other respects resembles the English pheasant more than it does the ringneck, is the

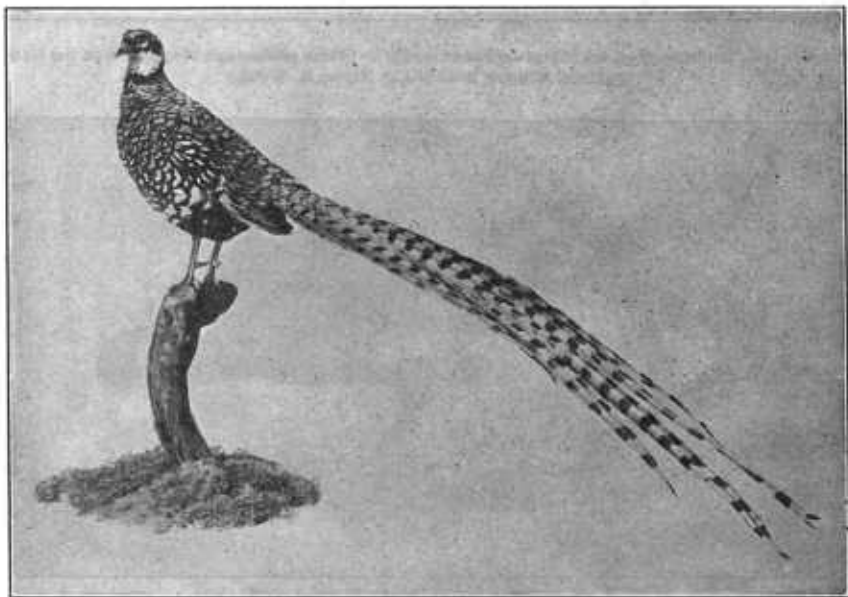


FIG. 5.—Reeves pheasant (*Phasianus reevesi*). (From photograph of specimen in the U. S. National Museum mounted by Nelson R. Wood.)

rarest of the four kinds in American preserves and aviaries. It is a native of the region about Lake Balkash, Central Asia.

The Bohemian pheasant and the white pheasant are merely color phases, chiefly of the English pheasant and the English ringneck.

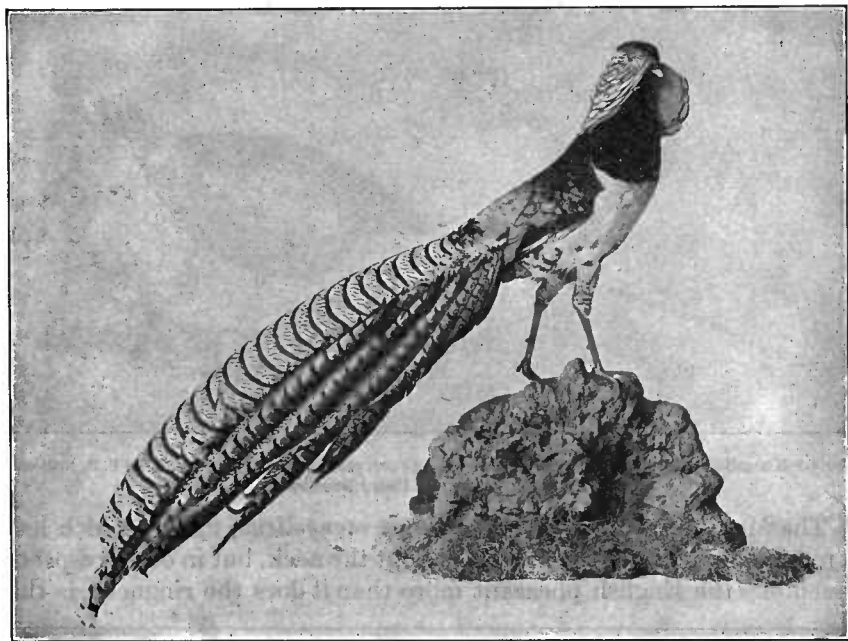


FIG. 6.—Lady Amherst pheasant (*Chrysolophus amherstiae*). (From photograph of specimen in the U. S. National Museum mounted by Nelson R. Wood.)

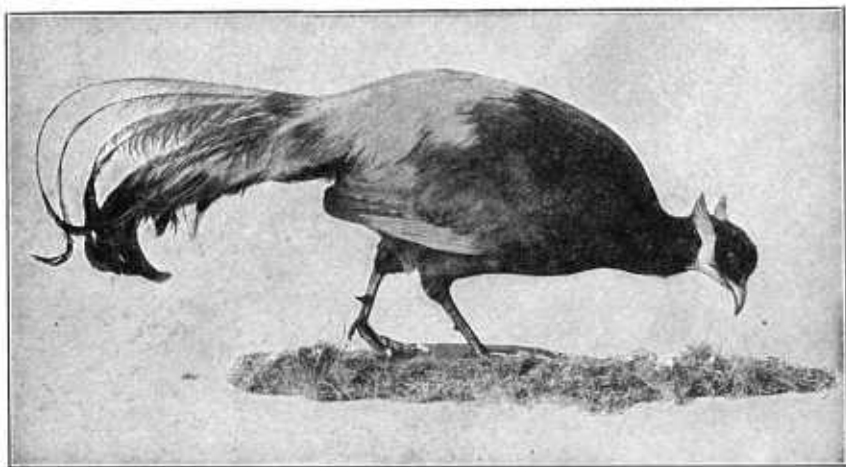


FIG. 7.—Manchurian pheasant (*Crossoptilon mantchuricum*). (From photograph of specimen in the U. S. National Museum mounted by Nelson R. Wood.)

The Reeves pheasant (fig. 5), a large and striking bird with a tail sometimes 5 or 6 feet long, is usually met with in aviaries, though it

has been placed in game coverts in Europe and, to a very limited extent, in the United States; and may still be found on certain Scotch estates, where it ranks very high as a game bird. It normally inhabits east central Asia.

Two of the best known and most commonly imported pheasants are the golden and Lady Amherst (fig. 6), both of the genus *Chrysolophus*, originally from the mountains of eastern Tibet and western and southern China. Both are favorite aviary birds, and the golden



FIG. 8.—Crimson tragopan (*Tragopan satyra*). (From photograph of specimen in the U. S. National Museum mounted by Nelson R. Wood.)

pheasant has been liberated in various game covers in America and Europe, but with indifferent success.

The silver pheasant (*Gennæus nycthemerus*) is often seen in parks and aviaries, but the numerous other members of the genus, usually called kaleeges (or kalijs), are not often imported into this country. The home of the genus is the Indo-Chinese countries and the lower ranges of the Himalayas.

The eared pheasants (*Crossoptilon*), large, dull-colored birds of the higher ranges of central and eastern Asia, are known in American aviaries mainly through the Manchurian pheasant (fig. 7), the most

northerly member of the genus. These pheasants lack the timidity so characteristic of most of the pheasant family and would probably lend themselves readily to domestication. At present their high price—\$40 to \$60 a pair—is practically prohibitive of any extensive attempt to domesticate them, but should they become more common, they would be excellent subjects for such experiments.

Other aviary pheasants are the horned pheasants (*Tragopan*, fig. 8), large, brilliantly plumaged birds, whose ranges extend from the Himalayas to central China; the firebacks (*Lophura*), likewise large, bright-feathered birds, from the Shan States, Cochin China, and the southern islands from Sumatra to Borneo; the peacock pheasants



FIG. 9.—Monaul (*Lophophorus refulgens*). (From photograph of specimen in the U. S. National Museum mounted by Harry Denslow. The light area on the wing is due to reflected light from its iridescent feathers.)

(*Polyplectron*), from the same general region; the monauls (*Lophophorus*, fig. 9), from the wooded heights of the Himalayas, the best known of which is the gorgeously iridescent impeyan pheasant; the Argus pheasants (*Argusianus*), the most expensive of all the pheasants and rarely imported from their home in Siam and islands to the southward; the blood pheasants (*Ithaginis*), from the high mountains of eastern Tibet, northern India, and western China; the koklass pheasants (*Pucrasia*), mountain birds of northern Afghanistan, eastern Tibet, China, and Manchuria; and finally the jungle fowls (*Gallus*), whose home is in the extreme south of Asia and islands to the south-

ward, and whose general appearance strikingly supports the belief that they are the birds from which our domesticated chickens are derived (fig. 10).

HISTORY OF PHEASANT RAISING.

EUROPE.

The English pheasant (*Phasianus colchicus*) derives its specific name from the ancient country of Colchis, on the eastern shore of the

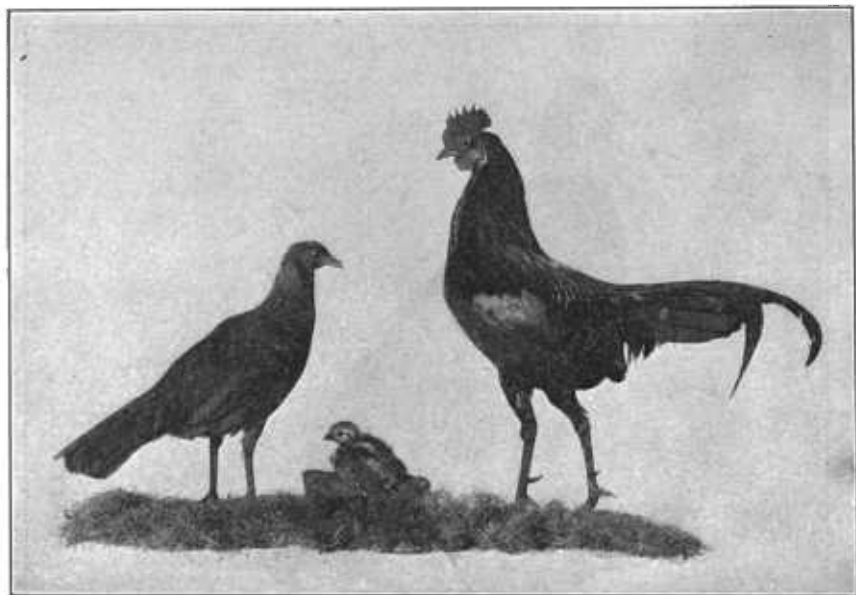


FIG. 10.—Red jungle fowl (*Gallus bankiva*). (From photograph of specimens in the U. S. National Museum mounted by Nelson R. Wood.)

Black Sea. It was imported thence into Europe by the Greeks, probably under Alexander the Great, and was by them reared for food. Perhaps at the same time, but probably one or two centuries later, it was brought from the adjoining country of Media to Egypt, where it was reared in the palace at Alexandria and was highly esteemed as a dainty for the table. Its propagation in confinement was continued in the days of the Roman Empire, under which it appears to have been carried throughout much of Europe and as far west as Britain. It was introduced into Ireland and Scotland before the close of the sixteenth century, and has recently been established in Sweden and Norway. It is now acclimatized practically all over Europe, and has been introduced into the United States, Canada, Australia, and New Zealand.

The pheasant was doubtless reared in English preserves from the time of its introduction, but the earliest actual evidence of its propagation is the record of the employment of a pheasant breeder for Henry VIII in 1502. At the present day the number propagated in confinement in England greatly exceeds the number breeding there in a wild or semiwild state. The comparatively recent introduction into Great Britain of the German custom of pheasant driving, which consists of shooting pheasants driven by beaters over the shooters, or 'guns,' has given great impetus to pheasant raising

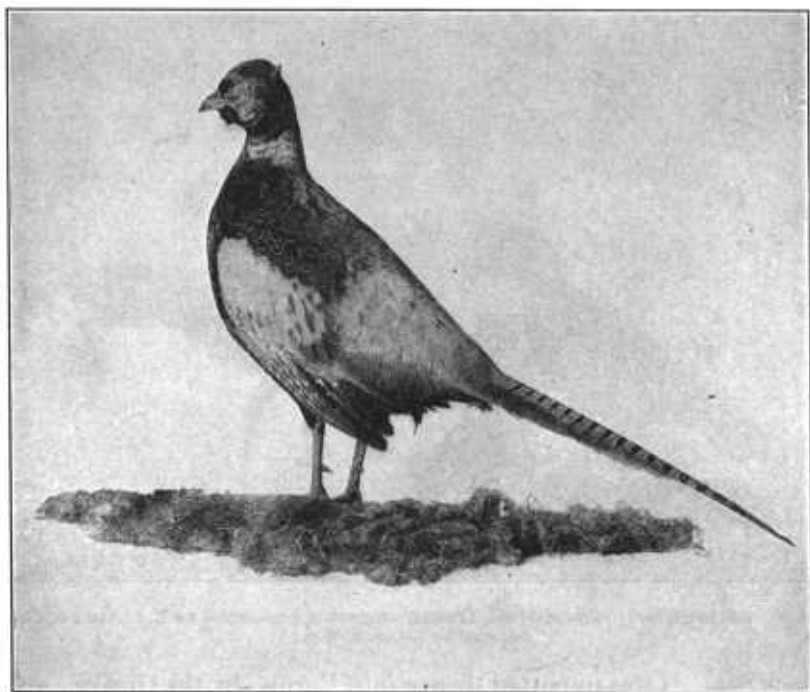


FIG. 11.—Versicolor pheasant (*Phasianus versicolor*). (From photograph of specimen in the U. S. National Museum mounted by Nelson R. Wood.)

during the past century, and the pheasant preserve is now a common adjunct of the English estate.

This stock, however, is nearly all of mixed blood. A little more than a hundred years ago the ringneck pheasant (*Phasianus torquatus*) was introduced into England and crossed with the English pheasant, then the only pheasant in British coverts. And about the middle of the last century the Japanese versicolor pheasant (*Phasianus versicolor*, fig. 11) was introduced for crossing with the hybrid English ringneck. Both species interbreed freely with the English

pheasant and with each other, and the hybrids are perfectly fertile. In each case the first effect of the crossing was a decided improvement of the stock, due doubtless to the introduction of new blood. As a result hybridizing became so popular that now, outside of Norfolk, where the original stock has to some extent been retained unmixed, pure birds of any one of the three species are rare in England. Other crosses also have been made, but only here and there, and without the same general intermixture of type as a result.^a

UNITED STATES.

Efforts to acclimatize pheasants in the United States are of comparatively recent origin, though earlier than is popularly supposed. More than a hundred years ago, Richard Bache, an Englishman who married the only daughter of Benjamin Franklin, imported from England both pheasants and partridges, which he liberated on his estate in New Jersey, on the Delaware River near where the town of Beverly now stands. But although he provided both shelter and food for them, the birds had all disappeared by the following spring.

A second attempt was made early in the nineteenth century by the owner of a New Jersey estate situated between the Hackensack meadows and the Passaic River, opposite Belleville. A park was fenced and stocked with deer and English pheasants, but despite feeding and careful protection these birds likewise disappeared during the winter.^b

Nearly eighty years ago, a writer in the *Turf Register* stated that Robert Oliver of Harewood, near Baltimore, Md., had for many years imported foreign game, including not less than 100 English pheasants. These increased rapidly and were in time turned out, some at Hampton, some at Brookland Wood, and a large number at Harewood. Those liberated at Hampton and Brookland Wood bred, and were occasionally seen afterwards, but those turned out at Harewood soon disappeared, the last being seen in 1827. In 1829-30, Mr. Oliver liberated at his estate at Oaklands, in Anne Arundel County, more than 20 pheasants of his own raising. On Mr. Oliver's

^a Because of this intermingling of species, all pheasants imported as pure stock should be examined carefully. Even in English pheasants that appear to be pure bred (that is, which have no trace of a white neck ring), the subterminal bar of the ring-neck is usually more or less developed on the feathers of the lower back, and the basal part of the central tail feathers is rather widely barred with black, instead of showing the narrow bar of the pure-blooded English pheasant.—Ogilvie-Grant, *Catalogue of Birds in the British Museum*, XXII, 321, 1893.

^b *Forest and Stream*, XXV, 103, Sept. 3, 1885.

death, his son Thomas continued the experiments, but they proved unsuccessful.^a

These initial importations were followed by similar attempts to stock private preserves, but met with like failure. About thirty years ago, however, a successful effort was made to introduce the ringneck pheasant into Oregon, and since then acclimatization experiments have followed broader lines and have assumed greater importance. It will be convenient to consider these later ventures by states.

Oregon.—In 1880 Hon. O. N. Denny, then United States consul-general at Shanghai, shipped a lot of ringnecks to Oregon. All died on the way but 12 cocks and 3 hens, which were liberated 12 miles from Portland, near the mouth of the Willamette River.^b The next year Judge Denny shipped another lot of ringnecks to Oregon, of which 28 (10 cocks and 18 hens) arrived safely at Portland and were liberated on the ranch of his brother, Mr. John Denny, in the Willamette Valley in Linn County.^c These birds increased rapidly and spread until they became thoroughly established in the State. A shooting season of two and one-half months was opened in 1892, and 50,000 were reported to have been killed on the first day. In 1896, 10,000 were marketed in one month, nearly double the number of native grouse sold.^d

The successful stocking of Oregon with ringneck pheasants at once aroused general interest in the United States, and requests for birds began to pour in. To meet the demands, numerous pheasantries were established in Oregon, and were soon doing a thriving business. The following list of shipments of pheasants from Oregon in 1899 indicates the widespread interest in the industry: Washington, 107; California, 187; Arizona, 2; New Mexico, 10; Idaho, 2; Montana, 9; Colorado, 73; Oklahoma, 2; Indian Territory, 6; Kansas, 3; Arkansas, 4; Missouri, 4; Iowa, 9; Illinois, 31; Indiana, 17; Ohio, 7; Tennessee, 12; Georgia, 12; Virginia, 6; Pennsylvania, 2; New Jersey, 2; and Massachusetts, 2; total, 509.^e Orders for pheasants for even Alaska and Mexico have been filled from these Oregon pheasantries. Most of the efforts to transplant the bird have failed, owing chiefly to unsuitability of locality or improper methods of handling, but in the region of original introduction the ringneck is now a permanent addition to the game list. It is fairly well established in Oregon, Washington, and British Columbia.

Massachusetts.—In Massachusetts state pheasantries were established at Winchester and Sutton in 1894. The first year's experiment with a setting of English ringneck pheasant eggs was unproductive, and in 1895 a few ringnecks were obtained from Oregon. The account of succeeding years, as told in the annual reports of the Commission of Inland Fisheries and Game, is a record of patient endeavor to surmount obstacles—cold and wet seasons that diminished the vitality of eggs and chicks, various diseases, mistakes in feeding, destruction by rats, deterioration of stock through inbreeding. These and minor difficulties marked one of the most thorough, capable, and untiring attempts to raise and liberate pheasants under state auspices

^a *Turf Register*, II, 227, Jan., 1831; III, 79, Oct., 1831.

^b *Annual Report Department Agric.* for 1888, p. 485, 1889.

^c Report of Fish and Game Protector of Oregon for 1895-96, p. 85, and letter from Hon. O. N. Denny, quoted in report of Massachusetts Fish and Game Commission for 1894, p. 17, 1895.

^d Report of Fish and Game Protector of Oregon for 1895-96, p. 89, 1896.

^e Rept. of Game and Forestry Warden of Oregon for 1899-1900, pp. 7-8, 1901.

made in this country. In 1906 an epidemic of cholera occurred at Sutton, and only 75 birds were raised from 1,200 eggs. Despite these numerous and dispiriting setbacks, several thousand pheasants have been liberated, and through these efforts and those of private individuals the State now contains a moderate stock in its covers. In November, 1906, more than 3,000 pheasants were killed in Massachusetts in the open season of one month. The game commission is now devoting its propagation experiments mainly to the restoration of native game, as more likely to yield satisfactory results than pheasant introduction.

Ohio.—Ohio records a similar experience. The game commission began in 1892 with English ringneck pheasants and their eggs. In 1895 it undertook the propagation of ringnecks, of which it raised several hundred in a hatchery established at Celina. Twelve ringnecks were placed on Rattlesnake Island, near Put-in-Bay, to breed in the wild state. Later a pheasantry was established at London, where operations were for a while very successful. In 1900, from 161 hens 7,075 eggs were obtained, of which 4,500 were set, and 2,575 distributed in the State. From the 4,500 eggs 3,181 chicks were hatched. Of those reaching maturity 2,239 were distributed, some being placed in every county in the State, and 418 were carried over to the next breeding season. During this year a three-week season was opened, but so great was public interest in the experiment that few took advantage of the opportunity to shoot the birds. On March 17, 1901, 38 cocks and 228 hens were placed in the breeding pens. The number of eggs collected was 9,041, of which 5,000 were set and 4,000 distributed (in 66 counties). At the pheasantry 3,420 chicks were hatched, of which 2,852 were reared. The distribution of adult birds was 1,688 (in 88 counties). In July, cholera made its appearance at the pheasantry, and before it was under control killed 1,124 birds. The following year the experiment was abandoned, as the impression prevailed that for climatic and other reasons pheasant raising could never produce satisfactory results in Ohio, and the legislature failed to provide the necessary funds. The game commission had reported that pheasant rearing involved large expense and that, despite the utmost care, disease was likely to sweep away a large part of the hatch. They stated that in their opinion better results could be attained by rearing quail. Pheasants in considerable numbers are still to be found in the game covers of Ohio, but they are likely to die out unless replenished with fresh stock.

New York.—In 1897 New York raised 40 ringnecks from a stock of 12 birds at its hatchery at Pleasant Valley. In 1898 its stock had increased to 180, and in 1899 more than 400 were raised; in 1900, 230 were hatched; in 1902 the stock was 520, of which 199 were liberated; and in 1903 it was 534, of which 225 were liberated. In 1904 cold and rainy weather reduced the stock to 448 and the experiment, although popular and successful, was abandoned as unprofitable, owing to the readiness with which pheasants could be procured from commercial hatcheries. Meantime the efforts of the game commission were being supplemented by propagation and liberation of pheasants by individual pheasant raisers. Hon. W. A. Wadsworth, of Geneseo, in particular, liberated a large number of pheasants in the Genesee Valley. In 1904 he turned out 350, one and a half times as many as were distributed by the game commission in that year. The total distribution of pheasants by the game commission, covering the period from 1898 to 1904, and embracing 47 counties, was 1,191, of which the average cost was \$12.50 per pair. Eggs were distributed to the number of 484; but this method of stocking the State was not deemed desirable and after one distribution was practically discontinued. At present many pheasants are being raised on private preserves in the State, particularly in the Adirondacks, on Long Island, and in the Genesee Valley, and the legislature of New York has recently passed a measure providing for the establishment of a state game preserve, where pheasant propagation will be resumed.

Indiana.—Indiana liberated about 700 English ringnecks and ringcrecks in the period from 1897 to 1902. A pheasantry was established at Madison in 1903 and, as usual, promised to be very successful, but it failed and was abandoned in 1906. At present the state game commissioner is trying the experiment of establishing numerous preserves of 4,000 to 10,000 acres each throughout the State by contracts with farmers. Imported pheasants and partridges purchased for the purpose are liberated on these preserves, and the farmers agree to allow no hunting thereon for four years after stocking. These birds are fed and cared for, but are allowed to propagate naturally. More than a hundred such preserves have been established within the last three years, with 40 to 100 game birds on each, mainly, however, Hungarian partridges, which the commissioner believes to be better adapted to the purpose than pheasants. The object of this course is to provide numerous refuges where the birds may increase and from which they may spread so as to stock the State. The movement is popular with both farmers and sportsmen and has thus far proved successful. The number of pheasants in the State at present is estimated by the commissioner at 6,000 to 8,000.

Illinois.—In 1891 a pair of ringnecks (the first, it is claimed, to cross the Rocky Mountains) was brought from Oregon by a citizen of Illinois and liberated at his home. This initial importation was followed by others, the total number shipped in the eleven years from 1896 to 1906, inclusive, being 135. Pheasants of various other species also were introduced, but all these attempts to stock the State were futile. The establishment of the resident-hunting-license system later produced a very large revenue, and it was decided to undertake pheasant propagation and introduction on a broader scale than had yet been tried anywhere in the United States. In the spring of 1905 a state game farm (fig. 1) was established on a tract of 400 acres, and here the work of pheasant raising was begun under the personal supervision of the state game commissioner. The main stock is English ringneck pheasants, though other species—ringneck, versicolor, English, and Mongolian—have been used in breeding experiments. The game farm has not been an unqualified success. An outbreak of roup in 1907 carried off thousands of the young of that year, and other obstacles have been encountered. In 1908, 20,000 eggs were distributed among the farmers of Illinois, while 15,000 chicks were hatched on the game farm. The extensive scale of this experiment gives it special interest, but it is too early yet to pronounce on results.

California.—In California the ringneck was introduced by private enterprise in 1894. In 1897 the board of fish commissioners began purchasing pheasants from Oregon, and from 1897 to 1900 bought and liberated 416 ringnecks and 153 English ringnecks. The commissioners subsequently abandoned the attempt to stock the State by this method, and have recently established a state game farm at Haywards. They are, however, devoting their efforts mainly to Hungarian partridges. They report that pheasants are being propagated in a small way by people in all parts of the State, and that there are probably a few breeding wild in the State, particularly in Santa Clara, Santa Cruz, Fresno, Humboldt, and Kern counties.

New Jersey.—New Jersey was one of the first States in which interest in the importation and propagation of pheasants was aroused, and several private preserves in the northern part of the State attest the continuance of this interest to the present time. About ten or fifteen years ago the state game commission bought and liberated a considerable number of ringnecks, which did well at first but soon began to decrease and in three or four years had disappeared. In 1904 the commission established a small preserve at Oradell and for a year or two undertook the propagation of pheasants on a small scale. The commission had in mind about this time the plan later adopted by Indiana of forming preserves by agreement with owners of contiguous farms, but does not seem ever to have put it into practical operation. Nevertheless, within the

past six years more than 2,000 pheasants have been distributed throughout the State, mainly in trios of one cock and two hens. Thus far the experiment has proved successful.

Vermont.—In Vermont more than 1,200 English ringneck pheasants were turned out in 1892 from Shelburne Farms, a private preserve, and later the Vermont Fish and Game League liberated a number of ringnecks. In 1902 the game commission reported that the latter attempt had failed, but that pheasants were yet to be found along the shores of Lake Champlain; these were, however, being exterminated by gunners.

Pennsylvania.—In Pennsylvania apparently no attempt has been made to stock the State with pheasants; but as early as 1871 a pheasantry with 30 birds was started at Blooming Grove Park, a large private preserve in Pike County. Since then the propagation of pheasants has been continued, the surplus each year (3,000 in 1904) being liberated in the preserve for shooting by the members of the association owning it. Other preserves have since been established in the State on which pheastries are conducted and small stocks of birds maintained.

Other States.—In Utah ringnecks liberated in Salt Lake County from a private preserve about 1895 were reported in 1906 as doing exceptionally well. In New Hampshire the game commissioner liberated a few English ringnecks and ringnecks in 1896, but apparently without lasting result. The Minnesota game commission started a pheasant propagation plant in 1905, and liberated a few birds, but on account of great mortality among the chicks little has been accomplished. The commission is still experimenting, but reports that it can buy pheasants more cheaply than it can raise them. Delaware, in 1903 and 1904, liberated 88 pairs of pheasants, which have practically disappeared. Kansas has liberated, since 1906, more than 3,000 ringnecks and English ringnecks, which are at present reported to be multiplying. In the past few years a propagating company has turned out a large number of pheasants in Colorado with results yet to be determined.

Private preserves.—In addition to these more noteworthy attempts to introduce pheasants into different States, many private preserves have been stocked with pheasants in the last thirty years, while to supply the demand for birds, numbers of individuals in this country have undertaken to propagate pheasants in confinement.

It is difficult to transplant pheasants to a new region without considerable care in feeding them and protecting them from enemies. Occasionally, as in the case of the ringneck pheasant in western Oregon, an exotic species finds the new conditions suited to its requirements and thrives, but such instances are comparatively rare. In rearing birds in confinement, however, success is less dependent on the character of the region than on individual experience and capacity. Most of the commercial pheastries established in the United States and Canada have been comparatively short-lived, but some have succeeded and have proved an important source of revenue to their proprietors. The private preserves have been, as a rule, fairly successful. On some, English gamekeepers and English methods are employed; others are American in character, though borrowing largely from the long experience of England and other countries of Europe.

PHEASANTS IN FIELD AND COVERT.

The failure of many efforts to add pheasants to our fauna is largely due to insufficient knowledge of their habits and the character of their normal environment. It is useless to undertake to acclimatize

a bird in a region differing widely in climatic and other physical conditions from those to which it has been accustomed. Thus, an attempt to introduce into one of the prairie States the common blood pheasant (*Ithaginis cruentus*), which inhabits the Himalayas at from 10,000 to 14,000 feet elevation, would result in failure.

It must be remembered, also, that introduced birds have to adapt themselves to a new flora and fauna, and that this is often a slow process and frequently fails. If liberated in the wilds, they must be provided with reserve food and shelter until able to care for themselves, which may take several years. In Oregon the ringnecks put out came at first regularly to farmyards to feed with the domestic fowls; and English ringnecks liberated on Grand Island, Michigan, were driven back by severe weather to the pens from which they had been allowed to escape a few months before.

If pheasants are imported for stocking preserves, suitable coverts should be prepared for them. In their native country pheasants frequent the margins of woods, coming into open tracts in search of food and retreating into thick undergrowth when alarmed. An ideal pheasant country is one containing small groves with underbrush and high grass between the trees, thorny hedges, berry-growing shrubs, water overgrown with reeds, and occasional pastures, meadows, and cultivated grainfields. Bleak mountains, dry sandy wastes, and thick woods are not frequented by pheasants normally; nor do they seek pines, except for protection. A small grove of mixed evergreen and deciduous trees on the southern slope of a hill furnishes favorable shelter.

On the preserve additional shelter should be provided in winter. Rude huts or even stacks of straw will serve. Suitable food should be planted—such as buckwheat, millet, corn, cabbages, and turnips. Stacks of unthreshed grain or of beans may be placed about the preserve.

When shooting is permitted, it is not wise to shoot only the cocks. If all the hens are spared, they will increase out of proper proportion, to the detriment of both quantity and quality of the progeny. Very old cocks and hens should be destroyed. Old cocks are inferior for breeding purposes, and old hens will frequently beat off 2- and 3-year-old hens and prevent their mating.

If the birds are annually caught up for breeding, it is important to remember that continued rearing in confinement tends to decrease of vitality and other changes that impair the value of a game bird. The Massachusetts Game Commission, after ten or twelve years' experience, found that their stock deteriorated, becoming smaller and more variable in markings and showing a lower vitality in both

eggs and chicks. An infusion of wild blood, especially of another species, will temporarily correct this tendency; though the experience of the last hundred years in England seems to indicate that hybrids eventually reach a grade inferior to that of either parent. Hybrids between the English pheasant and the ringneck, and later between this hybrid and the versicolor pheasant, were at first greatly sought, but at the present day the pure-blooded birds of these three species are more highly valued than the composite birds.

GAME PHEASANTS.

There is not much difference between the pure versicolor, ringneck, and English pheasants, as regards value in the field or on the table, though the Japanese bird is smaller than either of the other two, a trifle wilder, a more potent breeder, and possibly less disposed to stray; while ringneck hens are perhaps more prolific than those of the other species.

The Mongolian pheasant (*Phasianus mongolicus*), a large, hardy, handsome bird, may prove of value in game preserves. Pure stock of this species is maintained by Hon. Walter Rothschild in his pheasantry at Tring, Herts, England. The cross between this pheasant and the ringneck is reported as both larger and handsomer than the ringneck, and also a bolder flyer; but we should hesitate to regard this improvement of stock as permanent. The Prince of Wales pheasant (*Phasianus principalis*), recently introduced into England from Afghanistan, and since imported to a slight extent into the United States, is greatly praised by those who have tried it. The handsome Hagenbeck pheasant (*Phasianus hagenbecki*) from the Kobdo Valley in northwestern Mongolia (the most northerly point occupied by any member of the pheasant family) is strongly recommended by W. B. Tegetmeier, a leading English authority, on account of its large size, handsome plumage, and fine edible qualities; and the Reeves pheasant (fig. 5), in the few places where it has been tried, has proved very desirable. Many species of true pheasants (*Phasianus*) have not yet been tested in Europe or America, but probably each in a suitable region would prove satisfactory to both sportsmen and epicures.

As regards the pheasants of other genera, usually seen only in aviaries and zoological collections, some would be of little value in game preserves. Thus the Manchurian eared pheasant (fig. 7), a large and heavy bird from the mountains of Manchuria and northern China, is too tame and apathetic for the game fields. The silver pheasant, a favorite aviary bird and one of the easiest to raise in captivity, is not a satisfactory game bird, as it runs too much before

the dog, flies too low, and is rather inferior in flavor. In addition, its pugnacity makes it dangerous to other game birds. It is still found wild in limited numbers in northern Oregon, where it was introduced shortly after the successful introduction of the ringneck. The golden and Lady Amherst pheasants (fig. 6) have been introduced into game coverts, both here and in England, and the gorgeously feathered monaul (fig. 9) has received a limited trial in Wales. The better place for these birds is probably the aviary.

METHODS OF PROPAGATION.

OBTAINING STOCK.

A pheasantry may be started with mature birds or with eggs, the latter to be hatched by barnyard fowls. Many are tempted to begin with eggs because of smaller cost, but the uncertainties attendant on hatching the eggs and raising the young are such that it is probably cheaper to secure full-grown birds at the outset. If eggs are to be tried, they should be ordered in January or February, to be delivered in April or May. They should be placed under the hen as soon as possible.

Pheasants may be obtained from reputable dealers, of which there are a score or more in the United States and Canada, or they may be imported from Europe or Asia. If stock be imported, trouble may be saved by securing it through experienced and reliable bird importers, who are familiar with the business. A pen should be provided and supplied with food and water. On the arrival of the birds the crate should be placed in the pen, an opening should be made in the crate (preferably in the evening) sufficient to allow the birds to escape one at a time, and the attendant should withdraw, leaving the birds to find their way out alone. For the first few days they should be disturbed as little as possible.

PRICES.

The prices of pheasants vary with the season. They are lowest at the close of the breeding season and increase gradually until the next. They vary also according to the dealer; but so many things are to be considered, such as purity of stock, freedom from disease, care in shipment, and other details, that the lowest prices do not always mean the cheapest birds. English ringneck pheasants are least expensive—about \$5 a pair. English pheasants and ringnecks (the pure-blooded birds) cost a little more; Reeves and versicolor pheasants, about \$18 a pair; and Mongolian, \$40. Of the more common aviary birds golden and silver pheasants are the cheapest,

at about \$12 per pair; next in price are the Lady Amherst and Reeves, which retail at about \$18 or \$20 a pair, while others range from this price up to \$150 or \$200 a pair. These prices are only approximate, and serve merely to give an idea of the relative values of the birds mentioned.

PENS.

Any well-drained ground is suitable for pheasant pens, but a gentle slope of sandy loam, comparatively cool in midsummer, furnishes ideal conditions. Clay is the poorest soil for the purpose, as it is likely to foster diseases. The pens should be provided with plenty of both sunshine and shade. They should be constructed of chicken wire, like ordinary poultry runs. Each pen should cover at least 100 square feet, more if possible; contracted quarters induce disease and afford their timid occupants too little protection from alarms. The pen should be from 6 to 8 feet high, and should be inclosed above with wire. If the pheasants are likely to be disturbed much, cord netting should be stretched 6 inches or more below the top wire, to prevent the birds from injuring themselves by flying violently against the top, as they are apt to do when frightened.

It is of course feasible to keep pheasants in a pen open at the top, by pinioning them or clipping their wings. But pinioning, besides disfiguring pheasants, disables them permanently. Birds that are to be liberated should never be pinioned, as it makes them useless for sport and a ready prey to natural enemies. Clipping is objectionable, owing to the necessity for frequent repetitions. Pheasants are timid and the less they are disturbed the better, especially when breeding. Furthermore, clipping is not always effective, as clipped pheasants sometimes climb up the sides of the pen and escape. Another objection to open-top runs is the danger of attacks by hawks and owls, particularly if the run can not be readily guarded. If a small open shed or inclosure be placed at one end (the upper), the birds will always have a dry dusting place, also a shelter in wet or stormy weather. The floor of this shed should be the natural earth, to furnish dust baths for the birds, and it should be raised slightly above the level of the run to avoid flooding. Dust baths are as necessary to pheasants as to poultry. They free them from lice and keep the plumage in good condition. Mortar, cinders (which birds seek with avidity), and plenty of grit should be kept in the shed. The sides of the run may be boarded if necessary to furnish seclusion, though it is usual to board them only at the base (fig. 12), and a few pheasant raisers regard even this as objectionable. The side wire should enter the ground for a foot and a half or two feet, to keep out burrowing animals.

It is very advantageous to have for alternate use an extra communicating pen alongside the one occupied. This affords opportunity to freshen the ground, grow grass, clover, or other cover, separate birds with objectionable traits, and in other ways add to convenience of handling and safety of stock. It has been found, too, that after hen pheasants have stopped laying in one pen they may be induced to resume by removal to another. One pheasant raiser reports that seven of his hens laid 131 eggs and then stopped; but when he put



FIG. 12.—Breeding pen used on a Long Island shooting preserve. Boarded at base only. (Not in use at time photograph was taken.)

them into a fresh pen they laid 174 more. Perches should be supplied in the shed and also in the open pen. Pheasants usually spend the night in the open air in preference to the shed, even in winter. In their Asiatic homes, the English and ringneck pheasants are accustomed to severe cold weather in winter. They require protection from storms and dampness, rather than from low temperature, and they will frequently remain in the open runs during the roughest weather.

The pens and sheds should be kept scrupulously clean. There is no more fruitful source of disease among pheasants than uncleanness. As has been aptly said, the pheasant pen should be kept as neat and clean as the front dooryard. Nevertheless chips and twigs may be scattered about to attract insects, and boughs for shelter should not be omitted. Each pen should be thoroughly spaded and limed every two or three years. Cover should be provided for the birds. The pens may be sown with clover, timothy, and other grass early enough to furnish ample cover by the time the birds are turned in. Small evergreens may be grown inside with decided advantage, or cut branches of evergreen or deciduous trees may be placed within. If growing grass or clover can not be conveniently provided in the pen, a piece of sod should be placed there occasionally. The birds enjoy tearing sod to pieces for the seeds, insects, and grass it contains.

PROTECTION FROM ENEMIES.

Careful protection must be provided against various enemies. Hawks, owls, crows, and other predatory birds, as well as cats and raccoons,^a will be kept out if the top is covered. If traps and guns are used to protect pheasants from birds of prey, the destruction of mice-catching hawks and owls will result in serious losses through the unchecked increase of rodents. If the top of the pen is open, a foot of wire inclined outward and slightly downward should be extended from the top all around to prevent animals from scaling the sides. Burrowing animals may be frustrated by continuing the wire netting down into the ground, as already described. As an additional precaution it is a good plan to connect with the sides a strip of wire netting extending outward horizontally on the ground about a foot, as dogs, foxes, rats, and other burrowers try to dig close to the fence. Unbaited traps set alongside the pen will catch minks and other creatures that may be looking heedlessly for an opening. A lighted lantern on one of the posts at night will help to keep away minks. The old method of fastening a dog to a wire by means of a ring, which allows him to run along the wire for its full length, is still in use, and is an effective means of guarding the birds.

ATTENDANCE.

The pheasants should be attended, as far as possible, by the same person. It will even be well if the attendant always wears the same clothes when entering the pen, as pheasants are frightened by anything unfamiliar. English gamekeepers are accustomed to announce

^aTwo raccoons are said to have killed 150 young pheasants in one night on the Illinois State game farm.

their approach by whistling as they near the birds, whether these are in pens or in the open. A former pheasant raiser states that she always tapped with a fork on the china feeding dish to call the young pheasants together at feeding time. If the pheasants are not intended for game covers, it will be found advantageous to tame them somewhat by gentle treatment. When care and consideration are shown and occasional delicacies are fed, they will respond and will readily learn to eat from the hand. Besides the pleasure this brings to the attendant, this course diminishes danger of losses through the birds dashing themselves in fright against the netting.

EGG EATING AND FEATHER PLUCKING.

The need of plenty of room for penned pheasants can not be too strongly emphasized. Overcrowding, besides being conducive to disease, leads to the practices of egg eating and feather plucking. Egg eating is usually begun by cocks, though hens readily acquire the habit. Broken eggs left in the pens will almost certainly start it. The practice is more common in certain species, among them the Reeves and melanotte pheasants, than in others, while the versicolor seems to be free from it. If the pens are of ample size and the eggs are promptly and regularly removed, egg eating usually need not be feared. If begun, it should be checked at once. Various devices have been used to break up the practice, such as placing in the pen eggs of glass or wood, or eggshells filled with red pepper, soft soap, or other disagreeable substance. It is better, however, to remove the offender immediately to another pen, before the habit spreads. Feather plucking also requires immediate removal of the offender and of any badly plucked birds, which are likely to be objects of general attack, as otherwise serious damage to the other occupants of the pen may result. An abundance of room is preventive of both these faults. Cover should be provided for the hens in case the cocks are disposed to attack them. It may be necessary even to clip the wings of the cocks and furnish high perches for the hens to fly to for safety, or, better still, place in the pen a partition too high for the clipped cock to fly over.

FOOD.

Pheasants are small feeders, and there is greater danger of overfeeding than underfeeding. Overfeeding is productive of disease. In order to guard against it, the attendant should at first sprinkle a little food on the ground, wait for that to be eaten, and then repeat until the birds lose their eagerness, when feeding should be discontinued. The proper quantity of food for each pen may thus soon be ascertained. Pheasants are omnivorous, and as variety is advantageous, almost any edible substance may be fed—grain of all kinds,

finely chopped meat, cooked cereals, table scraps, boiled potatoes, boiled rice, apples, turnips, rose hips, the tubers of Jerusalem artichokes, and finely chopped green food, as lettuce, grass, cabbage, onion tops, garlic, and chickweed. Green food is important and should be constantly supplied, even if it must be raised under glass. All green food must be chopped fine, as otherwise the birds are likely to become crop bound. Ground bone is excellent. Seeds of various weeds, when obtainable, may be furnished; hay seed also is good. Chestnuts, especially wormy ones, add to the variety. Grit should be supplied, as with chickens, and charcoal and cracked oyster shells are of great service. The food should not be thrown on the ground, but should be put into flat tin or enameled dishes, which after each feeding should be removed with every scrap of scattered food. The dishes should be scalded daily. Water should be furnished freely, but must not be allowed to become dirty or stale, or to remain in the sun. Sun-heated water often causes fatal diarrhea. A trough of running water in the pen (fig. 13) is excellent.

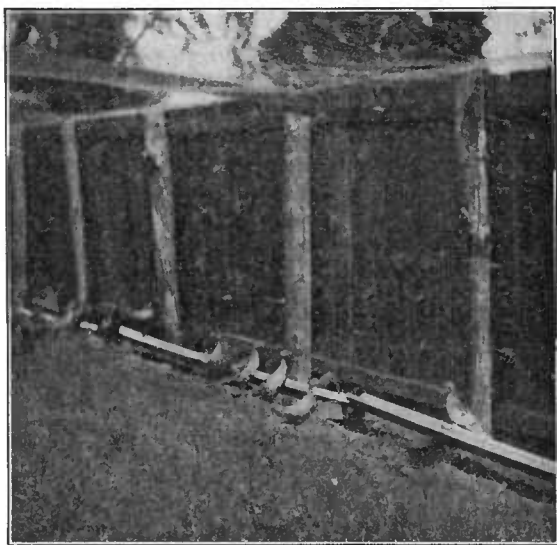


FIG. 13.—Side of breeding pen on a New Jersey preserve. Boarded at sides. The trough conveys running water from a cool mountain stream.

MATING.

The mating season usually begins in February and extends to June or July according to locality. As pheasants mate more readily if thoroughly accustomed to their surroundings, it is well to obtain stock in the fall. The birds should be placed in the breeding pens at least a month before the mating season. Most pheasants are polygamous,^a and each pen should usually contain one cock to from three to five hens, though the number of hens with one versicolor cock may range

^a Evidence indicates that in its natural wild state the English pheasant is monogamous. In game coverts, however, even when allowed to breed wild, it has acquired the habit of polygamy, owing, it is supposed, to the overproportion of hens resulting from the great destruction of cocks.

up to 30, while silver, Swinhoe, and Sœmmerring pheasants breed in pairs. An extra number of cocks should be kept to replace any that die or are killed. In some pheasantries all the pheasants of one species are placed in one large pen (fig. 14), the proper proportion of cocks and hens being maintained, on the theory that while a smaller number of eggs results from this method, the chicks are stronger. But during the breeding season pheasant cocks are very pugnacious, and if not kept separate are apt to injure one another. Hence it is customary to have a small pen, not less than 9 by 18 feet or more than 30 by 30 feet, for each cock and his hens. Breeding pens should be on well-drained ground, and should have plenty of cover, to furnish retired places in which the hens may deposit their eggs. Shelter is not usually necessary for the birds, but a dusting place must be provided, and for this

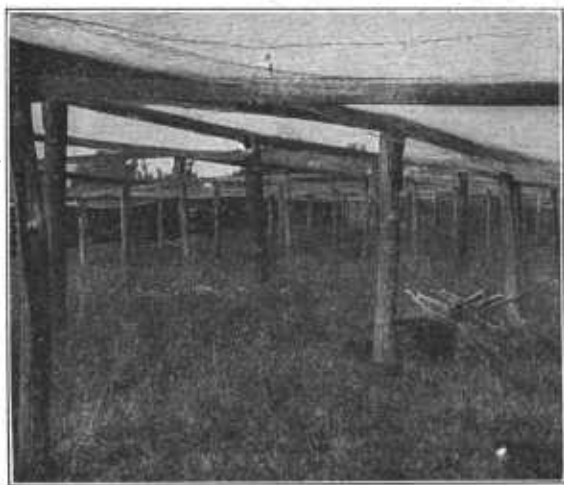


FIG. 14.—Breeding pen on a New Jersey preserve. Measures 100 feet by 200 feet, and accommodates 150 pheasants, which breed without separation. Note brush shelter provided.

purpose a shed should be placed at the side of the pen from which storms usually come, or some other means provided by which a spot may be kept dry.

The laying period varies somewhat with the species and locality. In northern New Jersey the ringneck, English, English ringneck, and Reeves begin about March 1 and continue to about the middle of July,

and the golden and silver lay from April 1 to about the middle of June. No nest is required. The eggs should be gathered once or twice daily. They should be placed in bran as gathered, and should be set as soon as possible; but if it is not convenient to set them at once, they will remain in good condition for not more than two weeks in a covered box of fresh bran kept cool and dry; they should be turned daily. During the laying period the birds should have a plentiful supply of fresh gravel, old mortar, cinders, and ashes. Iron tonic in the water once a week is beneficial.

HATCHING.

Eggs should be hatched under barnyard hens unless it is convenient to procure turkeys, which are excellent for hatching and for brooding the chicks. Pheasant hens are broody but very wild, and

the invariable experience has been that it is extremely difficult to secure satisfactory results by leaving them to hatch the eggs. Incubators may be employed, but the results are usually unsatisfactory. Bantams, especially Cochins, are frequently used on account of their lightness. In the Royal Zoological Gardens of Antwerp, where pheasants are reared very successfully, half-bred Japanese silkies are used. Hybrids between Japanese silkies and ordinary game have been tried with good results. The silkies are small, light, and broody, while the game make excellent mothers, owing to their fighting qualities. Wyandottes and Rhode Island reds are very satisfactory. Some of the large and successful pheasantries of the United States use any hens that are light, clean-legged, and free from disease, as it is difficult to secure enough sitting hens when they are wanted. A few pheasantries raise their own hens, which is perhaps the better practice. In selecting a hen, it is essential that she be free from scaly leg, roup, and lice. Dipping the hen's legs in a 5 per cent solution of carbolic acid before placing her on the eggs, and repeating the treatment several times during the season, is a useful precaution against scaly leg. To guard against lice, which are very fatal to young pheasants, the hen should be dusted with insect powder before she is set and once a week thereafter, though not within three days of the hatching. In addition to this precaution the hen should have ready access to a good dust bath. The style and dimensions of the hatching box or coop may vary according to the judgment of the pheasant raiser, but the simpler it is the better. It should have no floor, but should be simply a cover for the nest, more for protection than for warmth. It should be well ventilated; a close, hot, stuffy hatching box will soon be infested with fleas and lice, which irritate the hens and injure the chicks. Impure air also lowers the vitality of the chick, even in the shell. The nest should consist of a sod placed grass side down on the ground and lined with a little short straw or grass. A 1-inch mesh wire or board run should extend in front of the coop for at least 2 or 3 feet, in which the hen may eat, drink, exercise, and dust herself at pleasure, and in which the chicks may run before they are removed to the rearing field. The run should be covered with ordinary poultry wire. A hinged top to the coop is convenient, as it gives ready access to the nest and eggs. Food and water may be placed in the run once a day. If natural dust can not be readily secured, ashes may be supplied. It is well to place other eggs under the hen for a day or two while she is shaping the nest, and thus avoid possible loss of pheasant eggs by breakage. If many settings are made, it will be found convenient to record the date of setting and the number of eggs to each hen. This may be done by marking the eggs or labeling the coops. On the ninth or tenth day the eggs may be examined and the fertile ones distributed

so as perhaps to free one of the sitting hens for a fresh setting. If, however, only one or two broods are being raised, it is better not to disturb the hen by examining the eggs.

Nests should be kept clean. Broken eggs and all other refuse should be removed, and the remaining eggs washed, if soiled. The hen should, however, be disturbed as little as possible. When an egg has chipped but the chick is unable to break out in eight hours, it may be assisted by placing the egg in a shallow pan of water (at blood heat) for a minute or two, chipped part uppermost and out of the water, to avoid drowning the chick. The chick should never be drawn out of the shell by hand, but should be allowed to emerge naturally.

CARE OF YOUNG PHEASANTS.

The young should go without food for the first twenty-four hours after hatching, as during that time they derive all needed nourishment from the yolk, which they are then absorbing. Thereafter begins the most critical stage of pheasant life, and for two or three weeks watchful and unremitting care is necessary. Extreme cleanliness must be observed. Drinking and feeding vessels should be washed and scalded daily; weather conditions must be noted carefully, and every precaution taken to prevent exposure of the chicks to dampness or direct and excessive sun heat; the slightest disorder in the young must be treated promptly and decisively. In time of severe drought the grass near the coop should be sprinkled.

Some allow the chicks to remain in the hatching box and its run for three or four days before removal to the rearing field; others remove them at the end of twenty-four hours. Some use the same foster parent throughout; others, especially those rearing pheasants in large numbers, use separate hens for hatching and brooding, and make up broods of 15 to 20 by taking chicks indiscriminately from the hatching hens. In either event separate coops should be used for rearing and for hatching, and the rearing coop should be in its proper place in the field for a few days before it is to be occupied, in order to insure dryness of the ground beneath it. It is important to have clean sand or fine grit immediately available on removing the chicks to the rearing field.

The rearing field (fig. 15) may be in meadowland or in a garden or orchard according to convenience (a clover field is excellent); but it should be changed every year or two, in order to allow a restoration to normal abundance of its insect life, of which it will be largely depleted by the young pheasants. It should be large enough to permit the placing of the coops 30 yards or more apart, not only to give sufficient territory to each brood, but also to prevent the hens from killing chicks of other broods, as they sometimes do. If the rearing field is in grass or clover, paths 12 to 15 feet wide should connect the

coops, and narrower paths at right angles to these are serviceable. These should be mowed and the cuttings removed before the chicks are placed in the field.

The rearing coop (figs. 16 and 17), which may be varied in style, should be provided with a wire run for the first three or four days, until the chicks learn the voice of their foster parent. A satisfactory type is one 2 feet square, with a sloping roof 2 feet high in front and somewhat less at the back. It is better to have it like the hatching coop, without a bottom, though, if necessary to keep out vermin, it may be floored with a fine mesh wire netting. It should be provided with a hinged shutter in front, or some similar device, to prevent the chicks from going out when the ground is wet, which is apt to result in cramp, a rapidly fatal and highly infectious disease. Proper ven-



FIG. 15.—Rearing field on a pheasantry near Chicago, Ill. Note space between rows of coops.

tilation must, however, be secured. The coop should be shifted daily to a fresh spot, except when the ground is wet.

Near each coop there should always be a leafy branch to furnish shelter and shade for the young. The runs may be retained throughout the rearing season if there is danger from hawks or crows, but in this event they should be as large as possible.

The hens may be kept cooped and the young allowed to run at large, in which case the front of the coop must be covered with a large mesh wire netting or bars; or both hens and chicks may be allowed the liberty of the field. In this, as in many other matters, choice depends on local conditions. Thus it might be advantageous to allow the young pheasants to run in a vegetable garden, which would be materially damaged if the hens were given the same privilege. It sometimes happens, too, that the hen when at liberty loses one or more of

her brood. When possible, however, it is better to leave the hen free to go and come with the chicks.

While the young chicks require plenty of sunshine, it is important also that they be not exposed to the direct rays of the sun in very hot weather. They should not be given water that is not fresh and cool, and precaution should be taken that they do not drench or drown themselves in their drinking vessels. Shallow pans of water in which are placed stones the size of hickory nuts will avoid this danger.

FOOD OF YOUNG PHEASANTS.

Successful pheasant raisers agree that suitable food is most important in pheasant rearing, and each has his own formula. Certain gen-



FIG. 16.—Coops used on a New Jersey preserve. (These coops are closer together than usual.)

eral principles, which should always be kept in mind, are embodied in pheasant feeding. As with the old birds, it is better to err on the side of too little food than too much. Never feed more than the birds will eat up clean. In selecting food two things must be remembered—that variety tempts appetite and that a gradual transition from soft to hard food is required. Even seed-eating birds, such as sparrows and other finches, feed their young at first almost exclusively on soft-bodied insects. Young pheasants pick up many insects in the rearing field, but the supply must be supplemented. It is customary to depend on so-called ants' eggs (really the pupæ of ants), maggots, meal worms, or finely ground meat. Almost any soft-bodied insects would satisfy the need if they could be secured in sufficient quantity. Ants' eggs are much relished by young pheasants and are excellent food; but it is difficult to obtain enough of them, and unless they

can be obtained throughout the season it is better not to use them at all, as chicks will reject other food after having been fed on them. Meal worms are very satisfactory, but are difficult to raise in sufficient quantity. Maggots are equally good, and enough can be produced cheaply. The customary method is to suspend a piece of meat, or the carcass of a dead animal, over a barrel or tub of bran. The flesh becomes flyblown and the maggots drop into the bran. Before they are used the maggots must be thoroughly cleansed or they are apt to cause purging. This is usually done by putting burlap or very fine mesh wire in place of the bottom of the barrel or box of bran. They will work their way down through the bran in search of food and may be caught in a receptacle below, all ready for feeding to the pheasants. This method is very offensive, and may be replaced by permitting a carcass to become flyblown and then

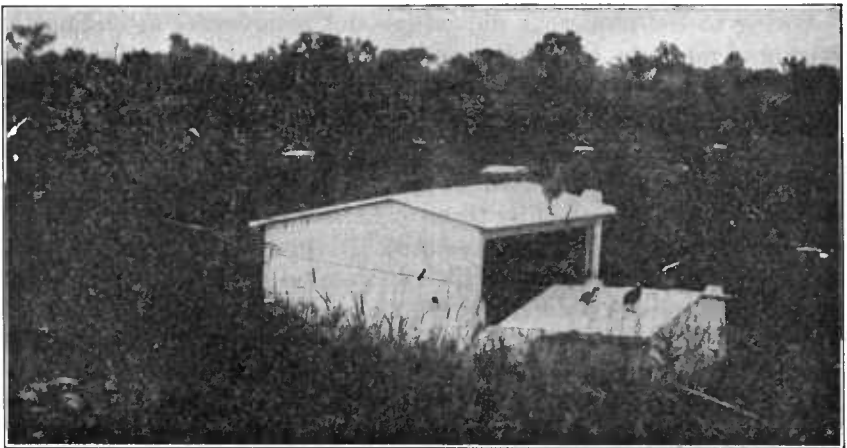


FIG. 17.—Coop used on an Illinois pheasantry.

burying it a few inches in the ground; the maggots will work their way to the surface, where they can be secured by the young pheasants. The Massachusetts Game Commission found sheep plucks the cheapest and most available material for producing maggots. Thirty-six plucks a week produce enough food for 200 young pheasants—36 to 48 quarts of maggots. Three times a week plucks were allowed to become flyblown, when they were taken into a small shed built for the purpose and hung on meat hooks. In about twenty-four hours the maggots dropped into boxes below containing 1 quart of ground beef scraps to 6 quarts of bran. They then dropped through the quarter-inch mesh wire cloth, of which the bottoms of the boxes were composed, into especially designed drawers. In four or five days after the meat was blown the maggots were fit for pheasant food. If not used within a few hours the maggots change into the chrysa-

lid state, unfit for the chicks; but development may be arrested for several weeks by keeping them in a temperature of 40 to 45 degrees. Care should be taken that unconsumed maggots be not permitted to transform in any considerable number into flies, as flies transmit disease.

The commission found the stench from raising maggots almost unbearable, and overcame the difficulty by exposing slightly tainted meat to the flies, cutting out the egg clusters as they appeared (with a small piece of the meat), placing them in moist bran, and feeding the maggots twice a day on as much thinly sliced fresh meat as they would eat up clean. It was found necessary, not only to devise means to obtain a supply of maggots early in the season, but also to replenish the stock of flies in the neighborhood. Maggots can be raised unobjectionably in piles of rotting seaweed, and near the sea-coast this method may be employed to advantage.

Owing to the numerous difficulties and annoyances attending the raising of maggots, ants' eggs, and meal worms, it is now the general custom to feed raw ground meat, which makes a fairly satisfactory substitute. Practically every specially prepared pheasant food on the market contains this ingredient.

No special food formula will be given here, as no fixed rule will meet all conditions. For the first three or four days the chicks are usually fed on a stiff custard of eggs and milk (10 eggs to each quart of milk, baked dry), with sometimes a little oatmeal added, but some successful pheasant raisers use hard-boiled egg grated fine, mixed with other food, such as browned bread crumbs, cracked wheat, finely cut onion tops or lettuce, crushed hemp seed, or canary seed.

After three or four days of the egg diet, whether custard or hard-boiled egg, more substantial food should be added and the egg gradually decreased. It is usual, while reducing the egg food, to feed a dry crumbly mash containing a number of different ingredients, such as corn meal, oatmeal, barley meal, boiled rice, a little ground meat, and some finely chopped lettuce, water cress, grass, dandelion leaves, onion tops, cabbage, chickweed, garlic, or similar green food. Canary, millet, or hemp seed may be added in small quantities for variety. A good general rule is "variety of dry food and liberality of green food." A satisfactory ration is composed of 1 quart of milk, 1 quart of bone flour, 2 quarts of corn meal, 2 quarts of wheat middlings, and 1 pint of beef scraps (ground fine).

After two or three weeks coarser ground food may be supplied safely and the grain gradually increased, both in size and quantity, until the fifth week, when whole wheat, barley, cracked corn, oats, and buckwheat may be added. Sunflower seeds, boiled potatoes, kafir corn, chopped artichokes, chopped onion, and baked bread crumbs are a few serviceable components of pheasant food that may

be used to vary the diet as the chicks approach maturity. In wet or cold weather a little pepper in the food is beneficial at all stages, and at the age of five weeks, when the full strength of the young pheasant is demanded for growing feathers, a little tonic solution of sulphate of iron added to the water daily has been tried with good effect.

As before stated, however, the change of food and the proportions in which different ingredients are combined must be determined largely by the judgment and experience of the one in charge of the birds. The nature of the locality, the character of the season, the abundance or scarcity of insect food, the kind of rearing field—these and other matters must be taken into account. The treatment here prescribed will serve as a foundation for the care of all kinds of pheasants.

After the first twenty-four hours food should be given every two hours for the first week or two; thereafter the feeding should be gradually reduced to three times a day at two or three months—that is, feedings should be two hours apart for the first and second weeks, three hours apart for the third week, and four hours apart for the fourth week and thereafter to about the tenth week.

While small, pheasant chicks heed the call of the brooding hen, after they learn it; but as they grow they become more and more independent, and usually show a tendency to stray. When they no longer need the fostering care of the hen they should be placed in large pens. Their wings must now be clipped, unless the pen be wired above.

CARE IN WINTER.

Many species of pheasants are able to withstand cold. Even when the mercury is below zero, they generally prefer to roost in the open runs, and they seem to be little discommoded by snow. Nevertheless, it is well to afford them shelter from severe storms and from excessive dampness; and some species normally inhabiting warm regions require housing in cold weather. Scrupulous cleanliness must be maintained throughout the winter, as at other seasons, and dust baths must be provided at all times. It is necessary to remember also that grit or fine gravel is essential to the proper digestion of food by pheasants. In winter it is not usually necessary to separate the cocks from each other or from the hens.

MARKETING PHEASANTS.

The successful raiser of pheasants will have surplus stock to dispose of. Cock pheasants are produced out of proportion to the number required for breeding; hens more than 2 years old are generally discarded for breeding purposes; and the natural increase will tend to outrun the limitations of the successful propagating plant. Under these circumstances many will wish to market their surplus. There is at present no lack of demand for pheasants for various purposes.

Live ringnecks and English ringnecks can always be disposed of to owners of private preserves and state game officials, for stocking covers, and to a smaller extent English, versicolor, Mongolian, and Prince of Wales pheasants will find a similar market. Zoological and city parks and owners of private aviaries are ready purchasers of the rarer and the more beautiful species. At present the demand for pheasants is increasing. Large numbers of dead pheasants are annually imported from Europe to be sold for several times the price they bring in European markets. In America, several states have recently passed laws permitting the marketing of domesticated game with suitable safeguards to prevent the unlawful marketing of native wild game under this privilege—a fact which indicates that American markets will open more and more to pheasant raisers.

SHIPMENT OF LIVE BIRDS.

The shipment of dead birds to market is simple, but a few words of advice as to methods of shipping live pheasants will be serviceable. Pheasants intended for shipment should be caught in deep nets a foot and a half wide that are provided with long handles. When put in crates, they must be held with the wings pressed against the sides and not carried by the legs, which are easily dislocated. The crate used should be deep enough to allow the birds to stand upright and commodious enough to avoid damage to their long tails (some breeders, when shipping, economize space by cutting off the tail feathers, which will grow out again at the next molt). The top of the crate should be of wood for long distances or wire for short distances. When of wood it should be amply padded, as pheasants, when frightened, jump up with such violence as to break their necks or scalp themselves if the top be solid. Burlap, stuffed 2 inches deep with straw, is a good padding. Ventilation should be provided by means of small holes near the top, and one side should be closed only by 1 or 2 inch mesh wire, with a loose burlap or cheese-cloth curtain, to allow sufficient air and at the same time prevent the pheasants from seeing out and thus suffering frequent alarms. The crates should have handles. The bottom should be covered with short straw. An ample supply of grain and water for the journey should be provided, or the express messenger should be instructed to supply these en route. For a journey of not more than forty-eight hours, green, succulent food, such as apple or cabbage, fastened inside the crate will supply all the food and water necessary. Lastly, the crate should be labeled "Live birds—rush."

Eggs may be shipped in various ways. They may be packed in cotton, hay, excelsior, or almost anything that will prevent breakage. It is necessary only to caution the shipper not to use sawdust, as the resin is likely to spoil the eggs.

DISEASES OF PHEASANTS.

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Health and disease are closely correlated with freedom and confinement. In the case of poultry, accustomed by long domestication to limited quarters, the larger the range the stronger the bird. The converse of this proposition is only too familiar to those who have attempted to rear pheasants. In fact, having pheasants in mind, one is tempted to formulate the law that the hardier the bird in the natural state, the greater the vigilance required to maintain it in health in captivity.

The first principle, then, in pheasant hygiene, is the recognition of the fact that health is more or less menaced by confinement, which necessitates curtailment of exercise, artificial alimentation, and unnatural shelter. It has been the object of the foregoing chapters to obviate these dangers as far as possible by suggestions as to the location and laying out of the pheasantries, the foods and methods of feeding, and the special care of the birds during the breeding season. However, as, in spite of the most careful attention, there will still be the possibility of diseases, this chapter will indicate methods of avoiding preventable diseases, and will suggest curative measures, wherever possible, for the others.

DISINFECTION.

The subject of disinfection (and along with it that of disinfectants) is one of extreme importance in even the most cursory sketch of diseases and their treatment. Its importance increases in one's mind in proportion to his apprehension of the extent and seriousness of infectious diseases. The fact that many diseases are caused by parasites, and are therefore transmissible directly or indirectly from one bird to another, or even from other animals to birds, makes apparent the necessity for thorough destruction of disease-producing parasites.

Disinfection of the grounds or runs is of supreme importance, and should be practiced not merely for the suppression of an outbreak of disease, but regularly as a routine method of preventing such outbreaks. Fire is the best disinfectant, and where disease agents are known to assume very resistant conditions, as, for instance, the eggs of worms or the spore cysts of the lowest animal forms like the protozoa, fire is the only absolutely reliable disinfectant. Where there is no danger to buildings, the ground may be sprinkled with kerosene and flamed. Even here we must recognize one possibility of failure. Earthworms may act sometimes as carriers of disease agents, and convey into the ground, on their bodies or in their alimentary tracts,

such agencies of disease as the eggs of the gape worm, or even the gape worm itself. After the ground has been flamed, and the surface thus perfectly disinfected, rain may bring the worms to the surface and with them the parasites they are carrying. Hence the necessity from time to time of another very good disinfecting procedure, namely, top-dressing with lime and plowing under. Where fire can not be used, this method is invaluable. Since some diseases appear to arise from contamination of the soil from prolonged occupancy, top-dressing with lime, plowing, and sowing some quick-growing green manure, such as cowpeas and oats, should be regarded as necessary routine. A third method of disinfection of the soil consists in sprinkling or deluging the ground with a solution of sulphuric acid (1 part acid to 9 parts water) or a 5 percent solution of carbolic acid (1 part acid to 19 of water).

Disinfection of buildings or parts of buildings involves the same principles. It may sometimes be best to burn old houses, or tear out old fixtures and burn them. Next in value is a thorough washing and scrubbing with hot water and soap and the application by spray or brush of a 5 per cent carbolic-acid mixture containing enough lime to show where it has been applied. A coal-tar disinfectant, if known to be good, may be used in place of the carbolic acid.

DISEASES AFFECTING YOUNG PHEASANTS.

Pasting.—Pasting occurs usually during the first week of life. The chick loses its vivacity, sits with eyes closed and its downy coat fluffed until it appears like a ball. Examination reveals the vent plugged or covered by a whitish, chalky, or pasty substance. This stoppage of the vent frequently leads to death in a day or two as the result of the absorption of putrefactive poisons due to retention of the feces. Treatment consists in the immediate gentle removal of this chalky plug and the application of a few drops of sweet oil or a bit of petrolatum.

Diarrhea.—*Whitish* diarrhea may be caused in very young chicks by cold, by overheating, by overfeeding, or by too little or too much water. The observant fancier will come to recognize these conditions almost instinctively and will relieve them by at once altering the régime. This should be all that is necessary. If more is required, it is evident that either the case has been permitted to run so long that the chick is too weak to recuperate or infection is operating.

White diarrhea of chicks, so dreaded by the poultryman, is an affection of pheasant chicks as well. The diarrhea is merely a symptom of a severe infection of the intestines, especially of the blind pouches or ceca, by a low form of animal life known as *Coccidium tenellum*, and we therefore speak of the disease as an intestinal coccidiosis. The white coloration of the fecal discharge, as in the two previous diseases, is due to excretions from the kidneys. In certain virulent forms of the disease the minute blood vessels on the inner portion of the intestinal wall burst, and the bleeding gives rise to a dark brown or even blackish coloration, which obscures the white effect of the uric acid.

Treatment should begin with the administration of Epsom salts, mixing them in a mash and estimating from 8 to 15 chicks to one teaspoonful of the salts, according to age, size, and previous thriftiness. The drinking water should contain sulphate of iron (copperas) in the proportion of 10 grains of the copperas to 1 gallon of water, or

enough permanganate of potash may be added to the drinking water to give the water a claret-red color. The coops, feeding utensils, drinking vessels, and runs should be disinfected, as previously directed (see p. 35). As a preventive measure, incubators and brooders should be cleansed and disinfected, and, prior to incubation, whether natural or artificial, the eggs should be dipped in 95 per cent alcohol or in a 4 per cent solution of some good coal-tar disinfectant.

Gapes or gape disease.—The disease known as gapes is particularly fatal to young pheasants. The two names given above are derived from its chief symptom. It is caused by a worm called *Syngamus trachealis*, the generic name, *Syngamus*, recognizing the permanent sexual union that exists between the male and female. For this reason the worm is also called the branched worm, forked worm, and Y worm. From its color it is known as the red worm. Attached to the wall of the chick's windpipe by means of the sucker on the head end of both male and female portions, it is only with great difficulty loosened by sneezing and coughed up. Death usually results from suffocation due to obstruction of the windpipe by the large, well-fed worm distended with blood drawn from its host, or to the presence of a few worms and excessive mucus combined, or again, to the presence of a large number of worms.

In addition to the symptom of gaping, there is a peculiar stretching out of the neck, with an actual gasping for breath. Many claim to be able to diagnose the disease by a characteristic sudden, whistling cough somewhat like a sneeze. However, as these symptoms might be easily counterfeited by bronchitis, pneumonia, so-called brooder pneumonia, which is really a mold infection of the lung, and roup disease of the larynx and windpipe, the only sure means of demonstrating the disease is to find the worm.

The usual method of treatment is to take a horsehair formed into a loop, a small feather from which have been removed all barbs save those at the tip, a timothy head treated in the same manner as the feather, or even (if great care is exercised) a very thin wire twisted into a loop, pass it gently down into the windpipe, and, after making a few turns, carefully withdraw it. Sometimes these instruments, before being used, are dipped in sweet oil, or sweet oil containing a few drops of turpentine. In this way the worms are either withdrawn or loosened from their attachment to the windpipe, so that the chick can cough them up. Garlic in the drinking water or mixed with the food has often proved efficacious.

Since the disease is spread by the young birds taking in with their food the worms and their eggs that have been coughed up by infected birds, one of the first steps in treatment is to remove all the birds from the infected ground and to separate the sick from the well. The infected ground should be immediately treated so as to destroy the gape worms and their eggs. As the earthworm has been shown to be, not an intermediate host, but a carrier of the gape worms or its ova, the surest way of raising the young chicks where the ground has probably been infected is to rear them on board floors.

Another method of treatment is fumigation. A smudge may be made from tobacco; tar or sulphur may be vaporized; or carbolic-acid fumes may be produced by pouring a small quantity into boiling water. Caution must be used in the application of this method, as there is great danger of suffocating the birds or of their being overcome by the drug effect of the substances volatilized.

Cramps.—Under the name of cramps, used by the keepers of pheasants, Dr. E. Klein, of England, has described a disease which causes great mortality among birds during the second and third weeks of life. It begins with lameness in one leg, followed the next day by lameness in the other. Death occurs, as a rule, on the third day. Post-mortem reveals softening and fracture of the thigh bone and of the bone of the leg, associated with the presence of considerable blood in the surrounding tissues. The only treatment is to destroy the bird, burn the carcass, and disinfect the grounds and houses.

DISEASES AFFECTING MAINLY ADULT PHEASANTS.

Roup.—Certain affections known as contagious catarrh, diphtheria, and roup, if, indeed, they be distinct diseases, generally group themselves in the fancier's mind under the one name, roup. The term diphtheria should not be used, because it belongs properly to that disease in the human family which is caused by a special bacillus which does not cause disease in birds. The other two names may represent two different stages of the same disease, a contagious inflammation of the mucous membranes of the eyes, nose, mouth, throat, gullet, or windpipe, which may express itself by a watery, sticky, bad-smelling secretion, or by the development of yellowish patches.

In the treatment of these affections the first thing is to recognize the contagiousness and to isolate the sick birds. Disinfect houses and grounds. Make a mixture of peroxide of hydrogen and boiled water, equal parts; into this plunge the head of the affected bird. By means of a slender wire covered with a little absorbent cotton and dipped in this mixture clean out of the eye or scrape off the tongue and sides of the mouth all yellowish matter and apply a 4 per cent solution of borax or boracic acid or the peroxide solution named above. Give all birds, sick and well, a dose of Epsom salts. Keep iron sulphate or permanganate of potash in the drinking water.

Pneumonia.—Pneumonia as a popular term in bird diseases probably often includes inflammation of the windpipe, inflammation of the bronchial tubes (bronchitis), and inflammation of the lungs. Difficult breathing, wheezing, coughing, and shaking the head, associated with the usual symptoms of feverishness, weakness, and loss of appetite, call for treatment. A purgative, such as Epsom salts or a teaspoonful of castor oil, should be given first. Keep the bird in a dry place. From time to time allow it to inhale the fumes of burning sulphur or tar or the vapors arising from carbolic acid in boiling water. Do not allow the fumes to become too dense.

Enteritis.—Enteritis, as used in bird medicine, means inflammation of the intestines. While it may originate from cold, improper feeding, and the like, it is usually an infectious disease and calls for prompt cleansing of the digestive tract, which is best accomplished by Epsom salts or a teaspoonful of castor oil containing about 15 drops of turpentine. Add iron sulphate or permanganate of potash to the water; isolate the affected birds. Disinfect thoroughly the houses, utensils, and grounds, and sprinkle lime everywhere. The causes may be coccidia, such as we find in white diarrhea of chicks; flagellates, as in the canker of pigeons; or bacteria, as in Klein's infectious enteritis.

Cholera.—Cholera would really come under the third class just mentioned. The organism causing it is frequently so virulent that death comes within a few hours, even before the diarrheal symptoms have had time to manifest themselves. The treatment would be practically that outlined under enteritis, although treatment is usually of no avail. Kill the very sick and treat only the apparently healthy, thus anticipating and preventing the disease. Necessary in all the other diseases, it is of supreme importance in cholera to burn quickly all dead birds, after saturating them with coal oil. Burying deep and covering with lime may have to do, but it is not so good a method. In killing the sick birds do not use the ax, and thus spatter everything with the infective blood.

Scurfy legs.—The affection known as scurfy legs, scaly legs, scabies, or mange of the legs and feet is caused by a parasitic mite, *Sarcoptes mutans*, which burrows under the scales and by its presence sets up an irritation which causes a rapid increase in production of cells, together with a secretion resulting in a gradual thickening and elevation of the scales. Being a parasitic disease, scaly legs is transmissible from one bird to another and from infested houses, perches, nests, etc. Treatment must begin

with isolation of the patient and the thorough application to the coops and fixtures of boiling soapy water, then kerosene, and finally a coat of 5 per cent carbolic acid, to which has been added enough lime to make a whitewash. The affected bird should have its legs soaked in warm soapsuds, this part of the treatment being completed by a good scrubbing with a small hand scrub. This alone has cured the disease. However, it is best to follow this with a good rubbing of sulphur ointment (1 part flowers of sulphur to 9 parts of lard, sweet oil, or petrolatum).

Scab.—Body mange or scab is caused by a sarcoptic mite, to which some authors have given the name *Sarcoptes laevis*. Loss of feathers at various points of the body calls for examination, which shows the skin apparently normal, but the feathers broken off at the surface. If the rest of the feather be pulled out, the roots will be seen to be covered with a dry, powdery mass made up of dead cells and parasites. Treatment calls for isolation of diseased stock, disinfection of coops and fixtures, and application to the skin of flowers of sulphur in the form of either a dusting powder or an ointment. The application of sweet oil containing a small quantity of kerosene or carbolic acid, carbolated petrolatum, or even lard with carbolic acid, will be found to give good results.

Air-sac mite.—Serious disease is frequently caused in a flock by the presence of the air-sac mite. This mite, *Cytodites nudus*, inhabits the air sacs of birds, chiefly those of chickens and pheasants. Often its presence in large numbers causes congestion and inflammation of the lining membrane of the air sacs. Sometimes the bronchi become plugged with them, sometimes a pneumonia is set up, sometimes the irritation opens the way for the entrance of bacteria which cause secondary disease and death. Treatment is very difficult and unsatisfactory. Sulphur mixed in the food has been recommended. The inhalations and garlic treatment suggested under gape disease might be beneficial.

White comb.—White comb or favus is a fungous or mold disease of the comb, head, and neck. It is caused by the *Achorion schönleinii*. In general appearance favus resembles mange. There is the development of white, powdery scales upon the comb, and the feathers of the head and neck become brittle and break off at the surface of the skin. The affected parts should be anointed with some oily substance like lard or petrolatum. After a few hours, or the next morning, scrub the parts with soap and water, rinse, dry, and apply ichthyol ointment (1 part ichthyol to 9 parts of petrolatum). In very stubborn cases tincture of iodine may be applied.

Intestinal worms.—Pheasants frequently harbor considerable numbers of intestinal parasites. It has generally been considered that no harm results to the bird from the presence of worms in the intestinal tract. Nevertheless, it must be recognized that the plugging of a part of the intestine by a ball of these worms or a long knotted rope composed of them must seriously derange the intestinal functions. Serious inflammation of the intestines is often caused by some of these worms. Where it is evident that a flock is thus infested, Epsom salts should be administered at least once a month. Birds that appear markedly affected may be given one teaspoonful of castor oil containing 15 drops of turpentine. Since the disease is spread by birds taking up with their food the eggs that were in the droppings of diseased birds, the ground thus contaminated should be thoroughly disinfected.

Tuberculosis.—Tuberculosis is not a subject for treatment but for eradication and prevention. It is fairly common among domesticated pheasants and is often spoken of as 'going light.' However, not all cases of 'going light' are cases of tuberculosis. When a bird dies of tuberculosis a post-mortem examination will reveal the liver, spleen, and intestines more or less filled with yellowish, cheesy lumps ranging in size from that of a pinhead to that of a walnut. Under microscopic examination these nodules or tubercles must always show the bacillus of tuberculosis or the disease should

not be called tuberculosis. There are other diseases characterized by lumps in the liver, spleen, and intestines. For this reason the first pheasant that upon post-mortem exhibits a nodular condition of the organs should be wrapped in rags previously soaked in 5 per cent carbolic acid and shipped to the laboratory of the Bureau of Animal Industry, Washington, D. C., or to the State Experiment Station, for diagnosis by microscopic examination.

When the disease is discovered isolate all 'going light' birds; disinfect their droppings; if they persist in their pallor and emaciation, destroy them; disinfect all grounds and buildings; keep lime sprinkled among the droppings. If hens are affected, but are still laying, cleanse the eggs in 95 per cent alcohol, hatch in a previously disinfected incubator, rear in sterilized brooders, and keep the chicks absolutely apart from all other stock. In this way a new flock completely free from tuberculosis can be developed.